

Haystack Crossing

Low Impact Development Narrative

March 3, 2020

As outlined in the Zoning Regulations

6.6.2 Stormwater Control

(5) Low Impact Development (LID). The use of LID design approaches shall be implemented, taking into consideration the site's soil characteristics, slope, and other relevant factors. To the extent that LID design approaches are not proposed in the stormwater management plan, the applicant shall provide a full justification and demonstrate why the use of LID approaches is not possible. See the Definitions section for an explanation of Low Impact Development.

We have summarized below the listing of Low Impact Development approaches offered in the reference document South Burlington Stormwater Utility Low Impact Development Guidance Manual, May 2009 (Manual). Within the examples set forth in that Manual, it is not represented that all of the listed LID best management practices be integrated into a project design. In fact the commercial example in the manual included just three (3) best management practices (from the 20 listed in the manual) with those three (3) being from three (3) of the six (6) major LID categories. The residential example included seven (7) best management practices from only two (2) of the six (6) LID categories (Conservation Design Practices, Infiltration Practices).

It should be noted that every site is different as it relates to the existing conditions that shape the application of LID BMP's. This project is primarily limited by low permeability soils with high groundwater table. In fact, even in the limited areas along Patrick Brook where sandier soils were mapped, the ability to infiltration BMPs is limited by the presence of a high groundwater table. To the credit to the Town, the Zoning Regulations have integrated into the project layout requirements some of the Conservation Design Practices outlined in the LID Manual.

Based on the narrative outlined below, you will see that the applicant is proposing the implementation of 12 of the best management practices outlined within all six (6) of the Low Impact Development categories. A significant improvement over the examples provide in the Manual.

2 Conservation Design Practices

Cluster Development – “Cluster development is a low impact development (LID) practice that promotes the construction of buildings concentrated in specific areas to minimize land development impacts and preserve open space”. As promulgated in the Zoning Regulations, the project proposes high density layout in support of the preservation of flood plains and stream buffers.

The Design Criteria in the Manual calls for “(d)esign consideration should also be given to provide pedestrian pathways, bikeways and common areas for shared community use. Disturbance to proposed open space areas should be minimized during construction activities. The limits of all open areas should be clearly shown on all construction drawings and identified onsite prior to construction to prevent inadvertent disturbance. Open space areas should be formalized through establishment of a conservation easement or other formal documentation process, as applicable”.

This project has been designed to include all of these features while focusing high density development is a specific core area of the property. The impacts to areas to be reserved is to be controlled through the use of construction limits demarcation. Open space areas will be either deeded to the Town or retained as common open space for the Haystack community.

Minimize Pavement Widths – This has been achieved by:

- Using on-street parking on only one side of the road in the residential areas.
- Using on-street parking on both sides of the street in lieu of less efficient off-street parking in the commercial areas
- Using alley type 14-foot wide streets (common driveways) for low volume mini neighborhoods.

Minimize Setbacks & Frontages – As outlined in the Manual’s definition “...Reduced setbacks result in structures located closer to the street, thereby effectively reducing the length of driveway needed to adequately access the site. Similarly, reduced frontage widths results in structures located closer together, ultimately requiring less public infrastructure, such as roadway and utilities...”

This project has adopted this approach through the use of narrow lots (60 to 70 feet) which in turn reduces the amount supporting roadway. The zoning regulations allow for a reduced front yard setback of only 10 feet compared to 60 feet in the AG, RR1 and RR2 districts.

Open Space Preservation – This practice promotes the conservation of natural areas such as:

- “• Undisturbed natural areas
- Wetlands, floodplains, vernal pools and associated buffers
- Forest retention areas”

All of the proposed development area is located within historically tilled farm land.

As part of the open space preservation efforts, this project has respected and implemented the standards set forth in the zoning regulations which implement riparian buffers along the two streams that frame the project. In addition, no activities are proposed in the major open space area to the west, while the major wetland complexes near the confluence of Riggs Brook and Patrick Brook have been avoided.

Shared Driveway – This project proposes two locations where alley type access ways act as shared driveways for lots without frontage on a public street. This approach eliminates the traditional obligation of providing street frontage and the associated increase in impervious surfaces. 22 lots will utilize these alley ways in lieu of curbs cuts on a traditional street.

Site Fingerprinting – from the Manual definition “Site fingerprinting is a low impact development (LID) strategy that minimizes the total amount of disturbed area at development sites by limiting construction related activities to areas that will be used for structures, roads and other infrastructure. This practice assists in minimizing land development impacts on local surface waters both during and after construction. In addition, site fingerprinting promotes the conservation of environmentally sensitive

natural areas. Site fingerprinting is also commonly referred to as minimal disturbance techniques.

For this project, those environmentally sensitive areas have been designed around and they are designed to be protected during the construction phase of the project through the use of construction limits demarcation tape or fencing. These measures are outlined in the EPSC 5.X series of plans.

3 Filtration Practices

Bioretention – as defined in the Manual “Bioretention systems are vegetated stormwater treatment facilities that capture and temporarily store collected runoff and allow it to pass through an organic media filter bed.....Bioretention facilities typically incorporate an underdrain mechanism to prevent prolonged ponding within the shallow surface depression”.

For this project, the challenge is the integration of a surface based stormwater best management practice in an area designed for high density development. Because of the high groundwater table, all bioretention facilities will need to be underdrained. The bioretention facility will provide localized cleansing of runoff but it will not significantly change the volume of water needing to be managed at the downgradient peak flow managing stormwater facilities.

Due to these constraints, Bioretention areas are not proposed to be part of this project.

Vegetated Buffer – The Manual provides the following definition “Vegetated buffers are undisturbed natural areas and planted areas where vegetation serves to manage stormwater runoff and provide a protective natural area along stream corridors. These vegetated areas can also provide aesthetic benefits, noise attenuation, functional floodplain and wildlife habitat. The term vegetated buffers is a general term that includes natural stream buffers and planted filter strips.

Initially through requirements set forth in the Zoning Regulations and subsequently through the applicant’s goals of restoring these buffers historically impacted by farming

activities, vegetated buffers will be implemented along both Riggs Brook and that portion of Patrick Brook where the buffer is located on the applicant's property.

The landscaping plans identify the buffer revegetation and reforestation efforts in these areas.

4 Infiltration Practices

Disconnection of Impervious Area - In heavy soils, this is perhaps the most suitable infiltration practice primarily because the surface topsoil is less dense than the underlying parent material and can accommodate the smaller more frequent storm events.

We have identified on the attached LID Sheet where the proposed grading of the many of the proposed single family homes will permit the use of disconnection of the roof top and driveway impervious surfaces. Coupled with the increase in rear yard setbacks discussed in Section 2 Conservation Design Practices, Minimize Setbacks & Frontages, the feasibility of disconnection is improved dramatically.

Infiltration Basin- This technique can be used on large flat areas such as common open space areas. Our concern is that with the low permeability of the native soils that this technique may actually hamper the active use of these areas many days after a storm event. *As such, this BMP is not proposed to be used on this project.*

Infiltration Trench – From the Manual “Infiltration trenches are underground chambers filled with crushed stone that treat stormwater runoff through the process of infiltration. Stormwater is temporarily stored within the voids of the stones, and is allowed to infiltrate through the bottom of the chamber and into the underlying soil media typically over a several day period. Infiltration trenches are also commonly referred to as dry wells. Much of the property is burdened by soils with low rates of permeability and high groundwater table. Underground chambers often fill up with groundwater when placed within the native soil profile. *Due to these conditions, infiltration dry wells will not be used on the project site.*

Porous Pavement - Due to the significant increase in the cost of installing a properly designed and installed porous pavement system (hampering the affordability of the homes), coupled with the fact that this system would need to be underdrained due to the high groundwater limitations of the site (negating the benefit of infiltration opportunity), *porous pavement is not proposed to be used on this project.*

Rain Gardens - The Manual defines rain gardens as “... vegetated stormwater treatment facilities that capture and temporarily store collected runoff and allow it to filter through a soil media bed. Rain gardens are shallow depressions that contain aesthetically pleasing, water tolerant plantings and can be designed to include an underdrain mechanism”. “ Rain gardens are commonly sited to treat stormwater runoff from residential lots and parking areas. Rain gardens are best suited for relatively flat, low areas that have well drained soils”.

Unfortunately there are no naturally occurring soils on the property that satisfy the “well drained soil” requirement and as such *this BMP is not proposed to be used on this project.*

5 Landscaping Practices

Landscaping Practices – The Manual defines in part this BMP as “...In general, these landscaping strategies attempt to mimic pre- development site conditions by enhancing opportunities for onsite infiltration, filtration and/or evapotranspiration of stormwater runoff. Examples of such LID landscaping practices include:

- Planting native, drought tolerant plants – The applicant is willing to include this as a condition of approval.
- Converting turf areas to shrubs & trees – This is more accurately described a converting previously tilled areas to shrubs and trees. These restoration efforts are depicted on the landscaping plans.
- Reforestation – Portions of the riparian buffer buffer along Patrick Brook are proposed to be reforested.
- Planting wildflower meadows rather than turf in open space. The planting of wildflowers is proposed for the lands located between the Bissonette recreation fields and the residential parcels to the east.

Soil Conservation & Amendments - As defined in the Manual “Conserving and amending site soils are low impact development (LID) strategies that minimize stormwater related impacts commonly caused by construction activities. These practices include protecting native site soils for use in final site landscaping and amending impacted soils to restore pre-development characteristics that allow for the storage and infiltration of stormwater”.

The EPSC plans identify the means of protecting existing soil profiles from unrelated construction activity. All native soils that are modified either through construction activity or modification of grades, are required to implement the requirements of a Post-construction soil depth and quality standards program. This is outline on the attached LID site plans and will be formalized in the State Stormwater submittal.

6 Runoff Conveyance Practices

Runoff Conveyance Practices – “Examples of such LID runoff conveyance practices include:

- Roughening Surfaces
- Creating Long Flow Paths over Landscaped Areas
- Creating Terraces & Check Dams”

Due to the high density nature of the project, there will be limited opportunity to implement these BMPs.

The *roughening of surfaces* will be implemented in transitional slope areas like the stormwater pond. However, many of the other transitional areas are not proposed to be regraded at all.

Creating Long Flow Paths over Landscaped Areas will be hampered due to the high density and broken up nature of the development area but we do see the opportunity for this BMP in the area between the Bissonette fields and the residential lots to the east.

Creating Terraces & Check Dams will not be implemented as there is little elevation change that either requires the use of terraces or justifies or practically allows for the use of check dams.

Vegetated Swale – As defined in the Manual “Vegetated swales are open channel treatment practices that are designed to treat stormwater runoff. As stormwater runoff flows through a vegetated swale, it is filtered by the vegetation in the swale and/or infiltrated into the underlying soil media. There are several variations of the vegetated swales, including: the dry swale, wet swale and the grass channel all of which are basic improvements on the traditional drainage ditch”.

Dry swales are underdrained swales that provide treatment through filtering of the collected runoff. They are designed to be located in moderately permeable soils. *Due to the high groundwater table, these would act more as dewatering features and will not be used on this project.*

Wet swale are designed to temporarily hold surface water. Due to the high density nature of the project and what will turn out to be the close proximity of the wet swales to the buildings and residential uses, *this BMP will not be employed on this project.*

Grassed Line swales are used extensively in Vermont and when used with suitable channel slope can provide a suitable means of surface water conveyance for small contributory areas without impacting the proposed land uses. This BMP will be used on this project as part of the site grading efforts within residential lots

7 Runoff Storage Practices

Green Roof – This BMP will be left to individual home owners or business owners to employ *but will not be a mandated feature of the LID BMP package.*

Rain Barrels & Cisterns – This will be offered to each property owner as part of the new homeowner package where gutters and storage of rainfall for re-use can be added.

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Underground Storage – Since most of the site is compromised by a high groundwater table, the ability to utilize underground storage is severely hampered. *As such, this BMP will not be utilized on this project.*

End of Narrative